WHAT IS CLAIMED IS:

1. A vehicle dynamics behavior reproduction system for adapting cornering stiffness to driving situation of a motor vehicle in order to describe accurately behavior of the motor vehicle on the basis of various information derived from outputs of on-vehicle sensors without being influenced by said driving situation of the motor vehicle, comprising:

vertical wheel force arithmetic means for arithmetically determining a load applied to each of wheels of said motor vehicle as a vertical wheel force;

lateral wheel force arithmetic means for arithmetically determining a lateral wheel force acting on each of said wheels;

cornering stiffness adaptation means for effectuating adaptation of the cornering stiffness at each of said wheels to said driving situation;

a state space model/observer unit for determining solutions of simultaneous differential equations relating to a dynamics theory of the motor vehicle for calculating variables involved in said dynamics theory;

a selector for selecting a specific signal as required from signals representing said solutions generated by said state space model/observer unit;

delay means for delaying said specific signal on a predetermined unitary time basis; and

tire side slip angle arithmetic means for arithmetically determining a tire side slip angle at each of said wheels in view of said driving situation,

wherein said state space model/observer unit includes a state space observer designed for determining variables which can not straightforwardly be measured.

2. A vehicle dynamics behavior reproduction system according to claim 1,

wherein said lateral wheel force arithmetic means is designed to approximate the lateral force F_Y at each of said wheels in accordance with

$$F_{Yij} = \left[k_1 - \frac{F_{Zij}}{k_2}\right] \cdot F_{Zij} \cdot \arctan\left(k_3 \cdot \alpha_{ij}\right) \qquad (1)$$

where F_Z represents said vertical wheel force,

α represents said tire side slip angle, and

k_1, k_2 and k_3 represent constant parameters specific to the tire.

3. A vehicle dynamics behavior reproduction system according to claim 1,

wherein said cornering stiffness adaptation means is designed to effectuate adaptation of the cornering stiffnesses of the individual wheels, respectively, to the driving situation on a predetermined unitary time basis in accordance with an undermentioned adaptation equation:

$$c_{ij}(t_k) = \frac{F_{Yij}(t_k)}{\alpha_{ij}(t_k)}, \ if \ \alpha_{ij}(t_k) \neq 0$$
$$c_{ij}(t_k) = const., \ if \ \alpha_{ij}(t_k) = 0 \qquad (2)$$

where c(t) represents the adapted cornering stiffnesses at the wheels, respectively, at a time point t,

$F_Y(t)$ represents the lateral forces of the wheels, respectively, at the time point t,

$\alpha(t)$ represents the side slip angles of the tires, respectively, at the time point t, and where

const. represents a constant used to describe the cornering stiffness in linear vehicle model theory.